EXPLAINING ONLINE PURCHASES IN THE EUROPEAN UNION: A COUNTRY-LEVEL PERSPECTIVE

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Abstract:

This paper investigates the determinants of online purchases in the European Union using annual country-level data for 2020–2023. We focus on macroeconomic (GDP per capita, inflation, consumption share), institutional (regulatory quality), technological (internet penetration, broadband subscriptions), and demographic (share of population aged 65+) factors. Our estimates show that income, regulatory quality, and internet use are strongly and positively associated with online shopping, while consumption share is negatively related. Inflation exerts a modest positive effect, and ageing unexpectedly supports digital uptake. The findings highlight that online purchases depend not only on technology but also on income, institutions, and demographics. We bring an EU-wide update for 2020–2023 and show which country-level factors move with online buying. We also flag a measurement gap: fixed lines are a weak stand-in for day-to-day retail connectivity, so future work should add mobile metrics (4G/5G coverage, typical downlink, data affordability).

Keywords: *online purchases, European Union, digital infrastructure, ecommerce*

JEL classification: *D12, L81, O52, E31*

Introduction

The growth of online purchases has become one of the most visible transformations in consumer behavior in the European Union during the last decade. Differences in income levels, digital infrastructure, regulation and demographics across member states explain why some countries have advanced much faster than others in adopting ecommerce. Studying these determinants at the country level helps policymakers reduce the digital divide within the Union and allows companies to adjust their market strategies more effectively. Firms that understand these dynamics can design marketing campaigns and investment decisions that match the realities of national markets rather than assuming a uniform European consumer.

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The COVID-19 pandemic acted as a catalyst for the adoption of online shopping. Lockdowns and restrictions on physical mobility pushed consumers to rely heavily on digital channels, while firms were forced to strengthen their ecommerce platforms to survive. The intensity of this shift was not the same everywhere. In countries with better infrastructure and high internet penetration the transition was smooth and created lasting habits, while in other places the process revealed gaps in digital inclusion and limited access for parts of the population.

After the pandemic new shocks reshaped consumer choices and firm strategies. The energy crisis that began in 2021 and the geopolitical uncertainty caused by the war in Ukraine raised inflation and reduced household purchasing power. These conditions made consumers more attentive to prices and often encouraged them to look for cheaper products online. At the same time companies faced supply chain disruptions and responded by strengthening their digital channels in order to reach customers more directly. Online shopping became more than a matter of convenience. It turned into a way of coping with uncertainty and rising costs which makes it even more important to study its determinants in the European context.

In this paper we investigate the main country level factors that explain the share of online purchases in the European Union during the period 2020 to 2023. The analysis considers macroeconomic indicators such as GDP per capita and inflation institutional variables such as regulatory quality, technological factors such as internet penetration and broadband subscriptions, as well as demographic characteristics such as the share of the population over sixty-five. The objective is to provide evidence on which structural conditions matter most for the diffusion of online shopping in Europe and to draw implications both for policymakers and for firms that operate in the digital marketplace. Our goal is explanatory rather than causal: we document robust associations between country-level drivers and online purchasing, based on comparable EU statistics.

Literature Review

Studies on online shopping often talk about how important information flows and digital channels are in shaping what people buy.

More and more people are adopting EU. Eurostat says that in 2014, 59% of people aged 16 to 74 bought things online. By 2024, that number had risen to 77%. In 2023, 23.8% of EU companies sold things online, and e-sales made up about a fifth of their total sales. All of these trends together make it possible for us to do our country-level analysis (Eurostat, 2024; Eurostat, 2025).

Chen et al. (2024) demonstrate that various information sources, including the internet, broadcasting, print media, and word of mouth, affect household expenditures on tourism, culture, and entertainment. Their findings underscore that the digitalization of information sources diminishes information asymmetry and fosters social interaction, thereby augmenting consumers' propensity to engage in online purchases. These insights indicate that transparency and accessibility to digital information are essential prerequisites for the growth of e-commerce.

Another area of research looks at how financial and digital inclusion change how people shop. Hu et al. (2022) discover that digital finance promotes household acquisition of insurance products by enhancing financial literacy and facilitating access to online financial services, especially among low-income and rural households. Zhu and Li (2025) further this research by examining how the digital divide in access, usage, and utility limits households' likelihood of acquiring commercial insurance. They contend that trust, social interaction, and

service accessibility can alleviate these obstacles. When looked at together, these studies show that digital infrastructure and inclusiveness are very important factors that affect how people shop online.

Structural and regional factors significantly influence e-commerce adoption. Lola and Bakeev (2023) examine regional disparities in Russia, revealing that the proliferation of online shopping is facilitated by the utilization of computers and smartphones, as well as elevated regional income; however, a pervasive distrust in digital platforms continues to pose a significant challenge. In another study, Konus et al. (2014) show that taking away a traditional sales channel like printed catalogs can make people buy things online instead and even make their orders bigger. Both contributions affirm that the adoption of e-commerce is contingent not only upon technology and income but also on the degree of consumer trust and the configuration of available sales channels.

Recent studies underscore the significance of innovation, macroeconomic stability, and consumer behavior within the European context. Wójtowicz et al. (2024) contend that nations characterized by elevated innovation levels demonstrate an increased propensity for online shopping and more sustainable consumption, a trend exacerbated by the COVID-19 pandemic. De los Santos (2018) emphasizes that consumer search costs influence online behavior, as customers generally patronize only a limited number of well-known retailers, thereby conferring a competitive edge to established firms in the digital marketplace. Özekenci et al. (2019) utilize panel data from Turkey and European nations to demonstrate that GDP per capita, internet penetration, and inflation are substantial determinants of online purchasing at the macroeconomic level. These results corroborate the notion that economic conditions, technological advancement, and institutional quality collectively influence the proliferation of e-commerce among nations. Based on the literature we looked at, we suggest two hypotheses that can be tested:

H1: An increased proportion of internet users within the population correlates with a rise in the proportion of online purchases.

H2: A larger percentage of people aged 65 and older makes fewer online purchases.

We also think that income per person and regulatory quality will be positively related, while the consumption share in GDP will be negatively related because of budget limits.

Data Description

We use annual panel data for EU member states (EUROSTAT and TheGLobalEconomy) during 2020–2023. The dependent variable is the share of individuals making online purchases. The explanatory variables capture macroeconomic, institutional, technological, and demographic factors that the literature has identified as potential drivers of e-commerce adoption.

- GDP_pc (GDP per capita, current US dollars).

GDP per capita is included as a measure of economic wellbeing and purchasing power. Higher income levels are associated with greater capacity for households to access digital devices, internet services, and delivery options, which are prerequisites for online shopping. Moreover, wealthier countries tend to have better developed retail and logistics infrastructure that supports e-commerce expansion.

- Cons_share (Household consumption as % of GDP).

This variable indicates the extent to which an economy is driven by household consumption rather than investment or exports. A higher share may suggest strong consumer markets, but it does not automatically translate into more online shopping. In economies where consumption is concentrated in essential goods, a larger share of GDP devoted to consumption could actually mean slower adoption of online retail channels.

- Inflation (Annual CPI inflation, %).

Inflation reflects the general price environment faced by consumers. In theory, higher inflation reduces real purchasing power and may constrain spending. However, households facing rising prices may also switch to online channels if these provide lower costs or better opportunities to compare prices. Therefore, the effect of inflation on online shopping is ambiguous and worth testing empirically.

- Reg_quality (Regulatory quality index, World Governance Indicators).

This index captures perceptions of the government's ability to formulate and implement sound policies that promote private sector development. Strong regulatory quality supports digital trust, secure payment systems, and fair competition in online markets. In contrast, weak institutions may discourage consumers from adopting e-commerce due to concerns about fraud, lack of enforcement, or inadequate consumer protection.

- Internet_users (Internet users, % of population).

Internet penetration is a direct precondition for online shopping. Without access to the internet, households cannot engage in digital commerce. The higher the share of the population online, the broader the potential consumer base for e-commerce. This is the most fundamental technological driver of adoption.

- Broadband_subs (Broadband internet subscribers, in thousands).

Fixed broadband subscriptions refers to fixed subscriptions to high-speed access to the public Internet (a TCP/IP connection), at downstream speeds equal to, or greater than, 256 kbit/s. This includes cable modem, DSL, fiber-to-the-home/building, other fixed (wired)-broadband subscriptions, satellite broadband and terrestrial fixed wireless broadband. This total is measured irrespective of the method of payment. It excludes subscriptions that have access to data communications (including the Internet) via mobile-cellular networks. It should include fixed WiMAX and any other fixed wireless technologies. It includes both residential subscriptions and subscriptions for organizations.

Fixed broadband matters for baseline access but is no longer the bottleneck for online shopping in much of Europe. People browse and buy on their phones, so 4G/5G coverage, typical mobile speeds and data prices describe retail connectivity better than household fixed-line counts. This likely explains why our fixed-broadband variable is not significant. Next steps should add mobile-network indicators or a simple "effective connectivity" index that blends fixed and mobile.

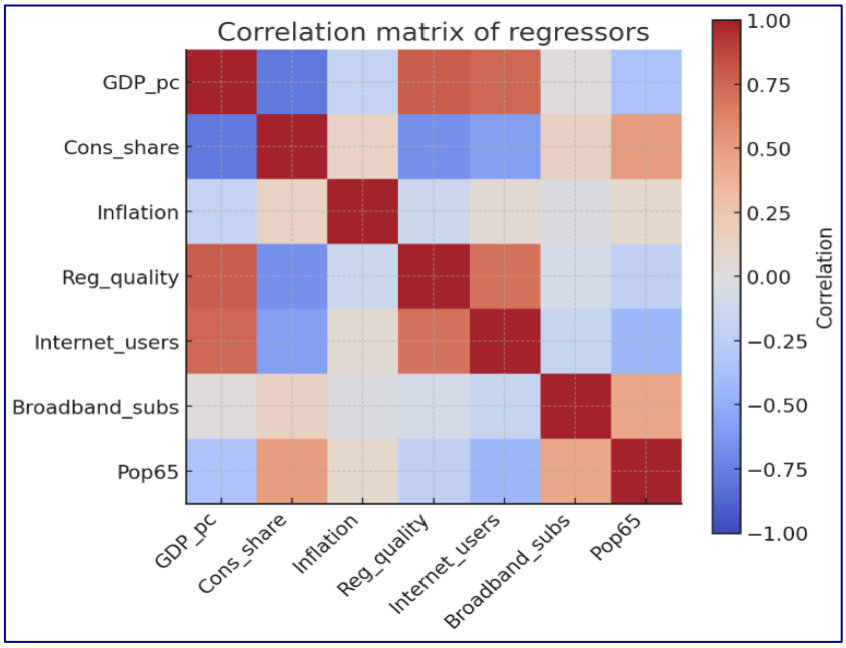
- Pop65 (Population aged 65+, % of total).

Demographic structure is also relevant for online shopping. Older populations are generally slower to adopt new technologies, which could reduce the overall share of online buyers. At the same time, the COVID-19 pandemic has shown that even senior citizens increasingly engage in digital commerce when circumstances demand it. The relationship between aging and online shopping is thus an open empirical question.

Since the regressors are conceptually related, we also examine the issue of multicollinearity. The correlation matrix (Figure 1) shows that some variables are strongly associated, for

instance income with both institutional quality and internet access. Others such as consumption share or ageing are moderately correlated with digital infrastructure. This indicates that the explanatory factors overlap to some extent, which requires careful interpretation of the coefficients. To address this, we consider them separately in the regressions and rely on robustness checks.

Figure 1. Multicollinearity checks



Source: own processing

Results

In Table 1 the estimation results are presented using random-effects GLS models where each explanatory variable enters separately. The choice of the random-effects specification is supported by the Hausman test which indicates that the more efficient random estimator is appropriate in this setting. In addition, all series are stationary in levels according to the Levin Lin Chu test, which ensures that the regressions are not affected by spurious correlations. The results therefore provide reliable evidence on the structural determinants of online purchases across European Union member states during 2020 to 2023.

The coefficients reported in Table 1 highlight the strong positive role of GDP per capita, regulatory quality and internet penetration in driving online purchases, consistent with previous studies that emphasize the importance of income, institutions and digital infrastructure for e-commerce development (Özekenci et al. 2019; Roszko Wójtowicz et al. 2024). The results also show that household consumption share is negatively associated with online shopping, suggesting that economies where consumption dominates GDP may rely more on traditional retail channels. Inflation has a small but significant positive effect, which may indicate that households under price pressure seek cheaper alternatives through online channels, a finding in line with evidence that shocks such as the energy crisis accelerated the turn to digital commerce.

Table 1. Random Effects results

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
GDP_pc	0.2402 (0.0000)						
Cons_share		-0.0088 (0.0000)					
Inflation			0.0028 (0.0035)				
Reg_quality				0.1789 (0.0000)			
Internet_users					0.0101 (0.0000)		
Broadband_subs						0.0319 (0.1856)	
Pop65							0.0221 (0.0098)
Intercept	-1.9452 (0.0000)	1.0119 (0.0000)	0.5426 (0.0000)	0.3622 (0.0000)	-0.3395 (0.0110)	0.3066 (0.1110)	0.1130 (0.5180)
R-squared	0.5817	0.5048	0.0038	0.5998	0.5356	0.0080	0.0459
Observations	108	108	108	108	108	107	108

Source: own processing. Note: Because predictors are expressed in heterogeneous units, we emphasize signs and significance; economic magnitudes should be compared with caution.

The remaining variables reveal mixed evidence. Broadband subscriptions are not significant, which suggests that general access to the internet is more critical than the intensity of fixed connections, in line with results from Lola and Bakeev (2023) who found that smartphone penetration matters more than technical infrastructure in explaining e-commerce adoption. This non-significance is consistent with a **mobile-first** shift in European online shopping; fixed-line subscriptions are a weak proxy for effective retail connectivity.

The share of the population aged 65 and above shows a positive coefficient, contrary to the traditional expectation that ageing reduces digital uptake. This reflects the pandemic-driven acceleration of digital inclusion among seniors and supports the view of Roszko Wójtowicz et al. (2024) that demographic trends interact with innovation and shocks in shaping consumption. The positive link for the 65+ share likely reflects habits formed after the pandemic, telehealth, home delivery, simpler interfaces, rather than “digital nativity.”

Conclusions

The findings have important implications for consumers. Higher income levels, better regulatory quality and wider internet access are consistently associated with higher online shopping. This means that consumers in countries with strong institutions and robust digital infrastructure benefit from more convenient, secure and affordable digital markets. At the same time, the positive link between ageing and online purchases suggests that digital inclusion has improved among older citizens, which can reduce social inequalities in access to goods and services.

For policymakers and firms, the results highlight the importance of macroeconomic and institutional factors in shaping e-commerce. Fiscal and digital policies that enhance purchasing power and trust in online markets will directly support further expansion of digital commerce. For fiscal authorities this means that stabilizing inflation and supporting

household incomes indirectly fosters e-commerce adoption. For companies the evidence suggests that investment in accessible platforms and clear communication of trust and security is essential, since consumers respond strongly to improvements in regulatory quality and internet penetration. Overall, the study confirms that online shopping is not only a matter of technology but also of institutional design and consumer confidence, which makes it a strategic priority for governments and firms alike.

For firms, three priorities stand out: fast, mobile-first UX; visible trust signals (verified reviews, easy returns, clear data use); and local playbooks that match income, institutions and logistics in each country.

Limitation

A key measurement limitation is our reliance on fixed-broadband subscriptions; future work should integrate mobile-network metrics or a composite 'effective connectivity' index. Other limitations include heterogeneous units across predictors, potential omitted variables (e.g., card usage, urbanization), and possible endogeneity.

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